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A

UTILITY PATENT APPLICATION TRANSMITTAL
(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.   80398.P217   Total Pages   3

First Named Inventor or Application Identifier Brant L. Candelore

Express Mail Label No.   EL 234 215 831 US

ADDRESS TO:	Assistant Commissioner for Patents
	Box Patent Application
	Washington, D. C. 20231

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.

1.   **X**   Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)

2.   **X**   Specification   (Total Pages __55__)
(preferred arrangement set forth below)
- Descriptive Title of the Invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claims
- Abstract of the Disclosure

3.   **X**   Drawings(s) (35 USC 113)   (Total Sheets _14_)

4.   **X**   Oath or Declaration   (Total Pages _4_)

    a.   **X**   Newly Executed (Original or Copy)

    b.   ___   Copy from a Prior Application (37 CFR 1.63(d))
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    i.   ___   DELETIONS OF INVENTOR(S) Signed statement attached deleting
inventor(s) named in the prior application, see 37 CFR 1.63(d)(2)
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5.   ___   Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or
declaration is supplied under Box 4b, is considered as being part of the
disclosure of the accompanying application and is hereby incorporated by
reference therein.

6.   ___   Microfiche Computer Program (Appendix)

12/01/97   - 1 -   PTO/SB/05 (12/97)

7. _____ Nucleotide and/or Amino Acid Sequence Submission
   (if applicable, all necessary)
   a. _____ Computer Readable Copy
   b. _____ Paper Copy (identical to computer copy)
   c. _____ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. __X___ Assignment Papers (cover sheet & documents(s))

9. _____ a. 37 CFR 3.73(b) Statement (where there is an assignee)

   __X___ b. Power of Attorney (Executed)

10. _____ English Translation Document (if applicable)

11. _____ a. Information Disclosure Statement (IDS)/PTO-1449

    _____ b. Copies of IDS Citations

12. _____ Preliminary Amendment

13. __X___ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)

14. _____ a. Small Entity Statement(s)

    _____ b. Statement filed in prior application, Status still proper and desired

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                 or

    __X___ Correspondence Address Below

NAME _Jeffrey S. Smith, Reg. No. 39,377_____

    _BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP_____

ADDRESS _12400 Wilshire Boulevard_____

    _Seventh Floor_____

CITY _Los Angeles_____ STATE _California_____ ZIP CODE _90025-1026_____

Country _U.S.A._____ TELEPHONE _(408) 720-8598____ FAX _(408) 720-9397_

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: _November 9_, 1999 By _____

Jeffrey D. Smith
Reg. No. 39,377

12400 Wilshire Blvd.
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-8598

Serial/Patent No.: _____* *_____   Filing/Issue Date: Herewith _____
Client: Sony Electronics, Inc.
Title: Method For Simulcrypting Scrambled Data To A Plurality Of
Conditional Access Devices
BSTZ File No.: 80398.P217   Atty/Secty Initials: MES/JSS/td
Date Mailed: _11-9-99_   Docket Due Date: _* *_

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☒ Drawings: 14 # of sheets includes 14 figures	☒ Fee Transmittal, in duplicate

☐ Other: _____
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3

UNITED STATES PATENT APPLICATION

FOR

METHOD FOR SIMULCRYPTING SCRAMBLED DATA TO A PLURALITY OF

CONDITIONAL ACCESS DEVICES

Inventor:

Brant L. Candelore

prepared by:

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN
12400 Wilshire Blvd., 7th Floor
Los Angeles, California 90025-1026
(408) 720-8598

Attorney Docket No.: 080398.P217

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METHOD FOR SIMULCRYPTING SCRAMBLED DATA TO A PLURALITY OF CONDITIONAL ACCESS DEVICES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to digital devices. More specifically, the present invention relates to a copy management system and method for

5 controlling the reproduction and recording of digital content on and from at least one digital device.

2. General Background

Analog communication systems are rapidly giving way to their digital counterparts. Digital television is currently scheduled to be available nationally to

10 all consumers by the year 2002 and completely in place by the year 2006. High-definition television (HDTV) broadcasts have already begun in most major cities on a limited basis.   Similarly, the explosive growth of the Internet and the World Wide Web have resulted in a correlative growth in the increase of downloadable audio-visual files, such as MP3-formatted audio files, as well as other content.

15 Simultaneously with, and in part due to, this rapid move to digital communications system, there have been significant advances in digital recording devices. Digital versatile disk (DVD) recorders, digital VHS video cassette recorders (D-VHS VCR), CD-ROM recorders (e.g., CD-R and CD-RW), MP3 recording devices, and hard disk-based recording units are but merely

20 representative of the digital recording devices that are capable of producing high

quality recordings and copies thereof, without the generational degradation (i.e., increased degradation between successive copies) known in the analog counterparts. The combination of movement towards digital communication systems and digital recording devices poses a concern to content providers such

5 as the motion picture and music industries, who desire to prevent the unauthorized and uncontrolled copying of copyrighted, or otherwise protected, material.

In response, there is a movement to require service providers, such as terrestrial broadcast, cable and direct broadcast satellite (DBS) companies, and

10 companies having Internet sites which provide downloadable content, to introduce protection schemes. Two such copy protection systems have been proposed by the 5C group of the Data Hiding Sub Group (DHSG) (5C comprising representatives of Sony, Hitachi, Toshiba, Matsushita, and Intel) and the Data Transmission Discussion Group (DTDG), which are industry committee sub-

15 groups of the Copy Protection Technical Working Group (CPTWG). The CPTWG represents the content providers, computer and consumer electronic product manufacturers.

The DTDG Digital Transmission Copy Protection (DTCP) proposal is targeted for protecting copy-protected digital content, which is transferred

20 between digital devices connected via a digital transmission medium such as an IEEE 1394 serial bus. Device-based, the proposal uses symmetric key cryptographic techniques to encode components of a compliant device. This

allows for the authentication of any digital device prior to the transmission of the digital content in order to determine whether the device is compliant. The digital content is itself encoded prior to transmission so that unauthorized copying of the content will result in copy having an unintelligible format.

5   One method of encoding the content has been proposed by the DHSG, and is based on watermarking techniques. Although the main focus of the DHSG proposal has been for copy protection of digital movie and video content, particularly as applied to DVD systems, it is expected to be applicable to the copy protection of any digital content distributed electronically via digital

10   broadcasts and networks. The watermarking techniques, which are invisible to the user, allow the incoming content to be marked in a manner that makes it extremely difficult to discern precisely how the content was encoded, and thus extremely difficult to remove or alter the watermark without damaging the content. The DHSG has determined three primary cases of detection and control

15   that such a technology should accomplish: playback, record and generational copy control. It is anticipated that the watermarking technology will allow the content provider to specify at least whether the content is "copy never," "copy once," and "copy free" content. "Copy never" is used to mark digital content to indicate that the content is not allowed to be copied, while "copy free" indicates

20   that the content may be copied freely and which can be marked with additional information. This is different than material that is never marked. Finally, "copy once" is used to indicate that the digital content is allowed to be copied only

once. As a copy is being made, the original "copy once" content and the newly copied content are re-marked with "no more copy." Of course, other types of copy management commands may limit the playing or reproduction of such digital content; for example, to a specific period of time, duration, or number of

5   plays or viewings.

Thus, even today, the functionality of digital devices such as set-top boxes, digital televisions, digital audio players, and similar such digital devices extends beyond their historical role of conditional access (CA), i.e., merely descrambling content to a CA-clear format for real-time viewing and/or listening,

10   and now include constraints and conditions on the recording and playback of such digital content. For example, currently, copying of scrambled content for subsequent descrambling and viewing or listening may be permitted with the appropriate service/content provider authorization or key provided to the digital device

15   A disadvantage of such digital devices is that do not allow the simultaneous viewing of content in a CA descrambled format (hereinafter referred to as "descrambled content") and the recording of content in a CA-scrambled content (hereinafter referred to as "scrambled content"), both of which are typically copy-protected, using, for example, some sort of watermarking

20   process, as proposed by the DHSG. Thus, the digital devices support either the viewing of descrambled content or the recording of such scrambled content, but not both. Additionally, in those instances where the digital device is connected to

other digital devices over a transmission medium via a digital interface, there may also be additional encoding at the digital interface prior to input into the transmission medium; e.g., using the 5C-proposed copy-protection scheme. In such cases, the viewable form, e.g., descrambled content, with "copy never" attributes would not be recordable by downstream devices. However, the non-viewable, or scrambled, content would typically have "copy free" attributes. As the simultaneous viewing of descrambled content and the recording of scrambled content is not possible under these scenarios, it is difficult to "time shift" copy-protected content and impossible to record a scrambled program while it is being viewed, even though such recording is for the viewer's/listener's sole entertainment at a later point in time. Both are considered desirable by viewers, listeners and other consumers.

Therefore, in view of the interests of the aforementioned viewers, listeners and other consumers, it would be desirable to provide a system that allows for the simultaneous viewing, listening or playing of descrambled content and recording of the scrambled content which also addressed the concerns of the various content providers.

SUMMARY

In accordance with an embodiment of the present invention, a method for storing a normal scrambled digital program is provided. The method includes receiving a scrambled program, and receiving a plurality of access requirements. Each access requirement can descramble the scrambled program. The method also includes selecting at least one of the access requirements, and storing the scrambled program and the selected requirement.

5

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example and not by way of limitation in the figures of the accompanying drawings, in which like references indicate similar elements and in which:

Figure 1 is a block diagram of an exemplary entertainment system including one embodiment of a digital device;

Figure 2 is a block diagram of one embodiment of a digital receiver of the digital device;

Figure 3 is a block diagram of one embodiment of the conditional access unit of the copy management system of the present invention;

Figure 4 is a block diagram of an embodiment of the conditional access unit of the system of the present invention; and,

Figure 5 is a block diagram of an embodiment of the digital receiver of the digital device.

Figure 6 is a block diagram of an embodiment of the digital receiver of the digital device.

Figures 7, 8, and 9 show embodiments of a filtering function.

Figure 10 shows an embodiment of an apparatus including conditional access units that can be simulcrypted.

Figure 11 shows an embodiment of a method simulcrypted conditional access unit.

Figure 12 shows an embodiment of a method for simulcrypting scrambled data to a plurality of conditional access units.

Figure 13 shows another embodiment of a method f-oir simulcrypting scrambled data to a plurality of conditional access units.

5   Figure 14 shows an embodiment of a method for simulcrypting during opportunistic bandwidth.

DETAILED DESCRIPTION

Figure 1 is a block diagram of an entertainment system 100 including one embodiment of the copy management system of the present invention. The entertainment system 100 includes a digital device 110 for receiving a digital bitstream including program data from one or more service providers. Such service or content providers can include terrestrial broadcasters, cable operators, direct broadcast satellite (DBS) companies, companies providing content for download via the Internet, or any similar such content and/or service provider. The program data may include system information, entitlement control messages, entitlement management messages, content, and other data, each of which will be described briefly. System information may include information on program names, time of broadcast, source, and a method of retrieval and decoding, and well as copy management commands that provide digital receivers and other devices with information that will control how and when program data may be replayed, retransmitted and/or recorded. These copy management commands may also be transmitted along with entitlement control messages (ECM), which are generally used by the conditional access unit to regulate access to a particular channel or service. Entitlement management messages (EMM) may be used to deliver privileges to the digital receiver 111 such as rights, access parameters, and descrambling keys. As known, a decryption key is generally a code that is required to restore scrambled data, and may be a function of the rights granted. Finally, content in the program data

stream may include audio and video data, which may be in a scrambled or clear format.

The digital device 110 includes a digital receiver 111, which processes the incoming bitstream, extracts the program data therefrom, and provides the program data in a viewable format. The thus extracted program data is then provided to a decoding unit 112 for further processing, including separation of the system information from the content, as well as decoding, or decompressing, of the content to its original form. The digital receiver 111 also regulates access to the program data by other components on the entertainment system 100, and according to one embodiment of the present invention, supports the simultaneous transmission of program data having content in a descrambled format (hereinafter referred to as "descrambled content") and program data having content in a scrambled format (hereinafter referred to as "scrambled content").

According to one embodiment of the present invention, the digital device 110 is a digital television set where the digital receiver 111 is a set-top box integrated therein, and the decoding unit 112 is an MPEG (Motion Picture Experts Group) decoder. The digital television set's display (not shown) is, according to this embodiment, integrated within the digital device 110.

Alternatively, it will be appreciated that the digital device 110 may include only the digital receiver 111 and/or the decoder unit 112, with a display being external to the decoding device 110. An example of this embodiment would be an

integrated receiver/decoder (IRD) such as a stand-alone set-top box which outputs NTSC, PAL or Y_pB_pR signals. All such embodiments are included within the scope of the present invention.

Digital device 110 may be coupled to other components in the

5   entertainment system 100 via a transmission medium 120. The transmission medium 120 operates to transmit control information and data including program data between the digital device 110 and other components in the entertainment system 100. It will be appreciated that the entertainment system 100 of Figure 1 is merely an exemplary embodiment, and that other analog and/or digital

10   components may be added or substituted for the components briefly described hereinafter.

Referring to Figure 1, the entertainment system 100 may include an audio system 130 coupled to the transmission medium 120. The audio system 130 may include speakers and an audio player/recorder such as a compact disc

15   player, a Sony MiniDisc® player, or other magneto-optical disc that may be used to play and/or record audio data. A digital VCR 140, such as a D-VHS VCR, may also be coupled to the digital device 110 and other components of the entertainment system 100 through the transmission medium 120. As known, the digital VCR 140 may be used to record analog or digital audio, video, and other

20   data transmissions, and according to an embodiment of the present invention, may be used to record program data received by the digital device 110 and transmitted to the digital VCR over transmission medium 120.

A hard disk recording unit 150 may also be coupled to digital device 110 and other components via transmission medium 120. The hard disk recording unit 150 may be a personal computer system, a stand-alone hard disk recording unit, or other hard disk recording device capable of recording analog or digital

5   audio, video and data transmissions. As with digital VCR 140, according to one embodiment of the present invention, the hard disk recording unit 150, may be used to record program data received by the digital device 110 and transmitted to the hard disk recording unit 150 over transmission medium 120.

Display 160 may include a high definition television display, a monitor or

10   other device capable of processing digital video signals. In an embodiment where the digital device 110 is a stand-alone set-top box, display 160 may be a digital television set.

Finally, a control unit 170 may be coupled to the transmission medium 120. The control unit 170 may be used to coordinate and control the operation

15   of some or each of the components on the entertainment system 100, as well and other electronic devices remotely coupled thereto.

Figure 2 is a block diagram of one embodiment of the digital receiver 111 including the copy management system according to the present invention. The digital receiver 111 includes a central processing unit (CPU) 210, which controls

20   the overall operation of the digital receiver 111, and determines the frequency in which a selected channel is broadcast or otherwise transmitted. This information is then transmitted to a tuner 220, which then selects the appropriate frequency

of the terrestrial, cable, satellite, or Internet transmission in which to receive the

incoming digital bitstream, including program data. The CPU 210 may also

support a graphical user interface (GUI), such as an electronic programming

guide (EPG), the latter allowing a user to navigate through various channels and

5   program options to select a desired channel or program for viewing, listening,

recording and the like. The GUI may be displayed on either a display (not

shown) of digital device 110 (e.g., where digital device 110 is a digital television

set), or on display 160 (e.g., where digital device 110 is a stand-alone set-top

box).

10   Once the tuner 220 has selected the appropriate frequency, it amplifies

the incoming digital bitstream, and provides the output bitstream to a

demodulator unit 230. The demodulator unit 230 receives the bitstream from the

tuner 220 and demodulates the bitstream to provide program data as originally

transmitted. The type of demodulation effected by the demodulator unit 230 will

15   of course depend on the type of transmission as well as the modulation process

used in the transmission process. For example, in the case of cable

transmissions and Internet transmissions received over cable modems, the

demodulator unit 230 may perform quadrature amplitude demodulation (QAD),

while for satellite broadcasts, quadrature phase shift key (QPSK) demodulation

20   will likely be required. Terrestrial broadcasts, will likely require vestigial side

band (VSB) demodulation.   The present invention is not limited to any one type

of transmission and modulation/demodulation scheme, and other schemes are

within the scope and spirit of the present invention. In addition to effecting the demodulation process, demodulator unit 230 may also perform error correction on the received bitstream.

The thus demodulated bitstream is now preferably provided to a conditional access unit 240. (That portion of the demodulated bitstream that is not encrypted may bypass the conditional access unit 240 and be provided directly to the demultiplexer 250 as shown by the dashed lines in Figure 2. This might also be the case where none of the bitstream needs decrypting, and/or where there is no conditional access module). The conditional access unit 240 generally performs key management and decryption, as well as descrambling functions as follows.

Typically, if the CPU 210 determines that the program data in the digital bitstream includes scrambled content, that program data is provided to a conditional access unit 240. At this point the CPU 210 may transmit packet identifier (PID) information to the conditional access unit 240, such PID information informing the conditional access unit 240 where in the program data the ECM may be found. The CPU 210 may instead receive the ECM and deliver it to the conditional access unit 240. Alternatively, the conditional access unit 240 may have demultiplexing capabilities allowing it to directly obtain the location of the ECM from the bitstream itself. As discussed previously, the ECMs regulate a user's access to a particular channel or service, and determines the access rights that are needed to be held by a receiver 111 in order to grant

access. The ECMs may also be used to deliver a decrypting or descrambling key or to deliver information (e.g., an algorithm) as to how to derive a key that may be used to descramble scrambled content. Using such key or information regarding derivation of such key, the conditional access unit 240 may

5 descramble the content contained in the program data. Alternatively, the conditional access unit may provide the key to the demultiplexer 250 which will perform the descrambling.

Importantly, although the conditional access unit 240 is shown as an integral, or embedded, in that both the descrambling and decrypting functions

10 are effected internally in receiver 111, the conditional access unit may also split or external. An external conditional access unit descrambles the program data content and decrypts the keys externally; e.g., as is the case with the National Renewable Security System (NRSS) conditional access modules. In a split conditional access unit, the program data content is descrambled within the

15 digital receiver 111, while the key decryption is completed externally, e.g., via a "smart card." All of these systems are intended to be within the spirit and scope of the present invention.

Once the conditional access unit 240 descrambles the program data content, the program data is input to demultiplexer unit 250, which separates the

20 system information from the content in the program data. According to an embodiment of the demultiplexer unit 250, the demultiplexer unit 250 parses the program data for PIDs that are associated with system information, audio

information, and video information, and then transmits the system information to the CPU 210 and the audio and video information to the decoder unit 112. In accordance with one embodiment of the present invention, a digital interface unit 260 is coupled to the conditional access unit 240. Operation of this unit, which

5   allows the receiver 111 to communicate with other digital components in the entertainment system 100, will be discussed at a later point.

The CPU 210, tuner 220, demodulator unit 230, conditional access unit 240, demultiplexer unit 250, and digital interface unit 260 may be implemented using any known technique or circuitry. In one embodiment of the present

10   invention, the CPU 210, tuner 220, demodulator unit 230, demultiplexer unit 250, and digital interface unit 260 all reside in a single housing, while the conditional access unit 240 resides in an external NRSS conditional access module (as discussed above). Alternatively, the conditional access unit can take the form factor of a Personal Computer Memory Card International Association (PCMCIA)

15   Type II card or a smart card.

Figure 3 shows a block diagram of one embodiment of the conditional access unit 240 of the copy management system of the present invention. The conditional access unit 240 includes a processor unit 330, which receives the demodulated program data from the demodulator unit 230 and obtains PID

20   information identifying where ECMs may be found in the program data. Again, this packet identifier information may be provided by the CPU 210 or obtained

directly from the bitstream by the conditional access unit 240 itself. It is also possible for the CPU 210 to deliver ECMs to the conditional access unit 240.

In one embodiment of the present invention, the processor unit 330 processes the ECMs and derives a key for descrambling the content. The

5 processor unit 330 then outputs program data and the key to a descrambler unit 340 over line, pin or set of pins 335 (hereinafter, "line 335"). The descrambler unit 340 receives the key and the program data off line 335 and processes the program data, including descrambling or decrypting the program data content with the key. The descrambler unit 340 then transmits the program data with

10 the now clear content over line, pin or set of pins 346 (hereinafter, "line 346") to the demultiplexer unit 250 (Figure 2), and then to the decoding unit 112, and finally for display and viewing by a user.

The descrambler unit 340 also transmits the program data with the now clear content over line, pin or set of pins 345 (hereinafter, "line 345") to a re-

15 scrambler unit 350. The re-scrambler unit 350 receives the program data and processes the data, including re-scrambling the clear content. Re-scrambling can use a similar algorithm as used in the descrambling process. For example, if DES could be used for both the descrambling and re-scrambling processes.

(It will be appreciated that although for ease of understanding, the

20 processor unit 330, the descrambler unit 340, and the re-scrambler unit 350 are shown as separate elements in Figure 3, these elements may be integrated in one device, or may be implemented using any known circuitry or technique).

The re-scrambler unit 350 may re-scramble the content in any one of several ways. For example, in one embodiment of the copy management system of the present invention, it may re-scramble the content using the ECMs originally transmitted in the received bitstream and received in receiver 111.

5   Alternatively, separate re-scrambling keys may be transmitted in the original bitstream in separate ECMs and extracted by the re-scrambler unit 350 from the program data received from the descrambler unit 340. In another embodiment of the copy management system of the present invention, the re-scrambler unit 350 may have encrypting or encoding capabilities, allowing it to re-scramble the

10   content using a local key which may be unique to receiver 111. Such a key would not be delivered using an ECM, but could be delivered to the re-scrambler unit 350 using an EMM. Alternatively, the key could be a non-changeable key which has been created at the time of manufacture of the re-scrambler unit.

In yet another embodiment of the present invention, control words may be

15   used in addition to keys. In such embodiment, the control words are first scrambled using a key, and then are inserted into the bitstream program data prior to transmission. Under this method, in order to descramble the content in the program data, the control access unit 240 must first derive the key (using any of the aforementioned methods) and then use the derived key to descramble the

20   control words. The descrambled control words are then applied to descramble the content. This method gives added flexibility and security in the transmission, particularly in the case where a local key is used (i.e., located in the receiver

111), in that the control words (and thus access rights) may be changed periodically without requiring a change of the local key.   Using this method, the re-scrambler unit 350 may scramble the content using one of several methods. The re-scrambler unit 350 may use the originally transmitted control words and

5   key to re-scramble the control words. Alternatively, the re-scrambler unit 350 may use local control words and keys that are unique to the receiver 111. It will be appreciated to those skilled in the art that any one of the aforementioned methods of scrambling and descrambling may be used alone or in combination, and these and other similar methods are intended to be within the scope and

10   spirit of the present invention.

Once the content is re-scrambled, the program data including the re-scrambled content is transmitted over line, pin or set of pins 355 (hereinafter, "line 355"). In one embodiment of the present invention, the re-scrambled program data is output over digital interface unit 260, as shown in Figure 2. The

15   digital interface unit 260 encodes this program data with copy management commands that indicate that the program data is "copy free." The digital interface unit 260 interfaces with the components on the transmission medium 120 (shown in Figure 1) to determine which components are authorized to decode the encoded program data, and then transmits a key to the authorized

20   components for decoding the encoded program data. According to one embodiment of the entertainment system 100, the digital interface unit 260 initiates an authentication process that identifies devices that are authorized to

decode encoded program data, and then encodes program data transmitted on the IEEE 1394 transmission medium using the DTDG's DTCP encoding scheme. It will be appreciated, however, that other encoding schemes may be implemented without detracting from the spirit and scope of the invention.

5   Thus, as line 346 transmits the clear content to the demultiplexer unit 250 for display on a display which is either integral with, or directly connected to, digital device 110, and line 345 carries the re-scrambled content over transmission medium 120 for recording on one or more of any of several components connected to the transmission medium 120, the conditional access

10   unit 240 allows the user to simultaneously view a program in the clear while recording the scrambled version. It will be appreciated that, under this embodiment, the content provider can control when and if the user can copy or even view the content again given that the re-scrambled stream which is output over line 345 must be descrambled with the appropriate keys and/or control

15   words before viewing, and thus must be processed by the conditional access unit 240.

An alternate embodiment of the conditional access unit 240 of the copy management system of the present invention is described with reference to Figure 4. In this embodiment, the conditional access unit 240 includes a

20   processor unit 330 similar to that described in Figure 3. The processor unit 330 also outputs program data which may include scrambled content over a line, pin, or set of pins 335 (hereinafter, "line 335") to a descrambler unit 340.

Descrambler unit 340 is also similar to the descrambler unit 340 of the embodiment of Figure 3.

At this point, the descrambler unit outputs program data with clear content to either the demultiplexer unit 250 or to the digital interface unit 260 via line 345.
5   The conditional access unit 240 also includes a line, pin, or set of pins 436 (hereinafter, "line 436") coupled to line 335 which bypasses the descrambling unit 340 and which transmitting program data, possibly including scrambled content, to the digital interface unit 260.

As with the embodiment disclosed in Figure 3, the conditional access unit
10 240 of Figure 4 provides two bitstreams of program data; line 345 carries program data including clear content, while line 436 carries program data including scrambled content. Thus, as line 345 transmits the clear content to the demultiplexer unit 250 for display on a display which is either integral with, or directly connected to, digital device 110, and line 436 provides the scrambled
15 content over transmission medium 120 via digital interface unit 260 for recording on one or more of any of several components connected to transmission medium 120, the conditional access unit 240 of the embodiment of Figure 4 also allows the user to simultaneously view a program in the clear, while recording the scrambled version. As with the embodiment of Figure 3, a content provider can
20 control when and if a user can copy or view again copy-protected content.

It is expected that there will be multiple content and service providers as well as multiple manufacturers of digital devices such as digital device 110. As

a result, it is envisioned that there may be certain instances where the embodiments of conditional access unit 240 as shown in Figures 3 and 4 are not available. For example, a content or service provider may desire that the copy management system of the present invention be implemented in any digital

5   device 110 which is authorized to receive such content or service, without regard to the manufacturer or particular design constraints of the digital device 110. Furthermore, in instances where either the content provider or device manufacturer wishes to implement the copy management system of the present invention on devices which may already have a conditional access system

10   implemented, access to the implemented conditional access system to add the copy management system of the present invention is likely to be limited and/or costly. For example, addition of the re-scrambling unit 350 of the embodiment of the conditional access unit of Figure 3 may not be possible, nor may the availability of an additional line 436 for providing scrambled content (embodiment

15   of the conditional access unit of Figure 4). It may be desirable and/or necessary in these and other instances to implement a separate conditional access unit.

As seen in figure 5, an alternate embodiment of the digital receiver 111 having the copy management system of the present invention includes an additional conditional access unit 540. Although the conditional access unit 540

20   may be built into the digital receiver 111, it is expected that digital receiver will have an expansion slot, such as a PCMCIA slot or Universal Services Bus (USB) slot to receive a card or device which includes the conditional access unit 540.

As with the embodiment of Figure 2, the digital receiver 111 of this embodiment includes a CPU 210, a tuner 220, demodulator unit 230, a conditional access unit 240, a demultiplexing unit 230, and a digital interface unit 260. In addition to these elements, the digital receiver 111 of Figure 4 includes a second conditional

5 access unit 540, the operation of which will be now described.

Conditional access unit 540 receives an output bitstream including program data having clear content from first conditional access unit 240, and re-scrambles the data in response to control commands received from CPU 210. Conditional access unit 540 may re-scramble the program data content using the

10 ECMs transmitted in the original bitstream received in digital receiver 111 or with a key transmitted by the conditional access unit 240. Alternatively, conditional access unit 540 may use its own unique, local key. If the content was originally scrambled using control words in addition to keys, the conditional access unit 540 may use the originally transmitted control key to scramble the control words

15 and use the originally transmitted control words to scramble the program data content. It may also use its own local control words and key to scramble the key and content, respectively. It will be appreciated to those skilled in the art that any one of the aforementioned methods of scrambling may be used alone or in combination, and these and other similar methods are intended to be within the

20 scope and spirit of the present invention. It will also be appreciated that conditional access unit 540 also operates in a manner similar to that of re-scrambling unit 350 of the conditional access unit 240 of Figure 3, however,

again, access to the original conditional access unit 240 is not required in this embodiment.

Once the program data content is re-scrambled, conditional access unit 540 transmits the program data to digital interface unit 260, where it is encoded

5   with copy management commands. Thereafter, the program data may be provided over transmission medium 120 to any components connected thereto for recording. Thus, according to this embodiment of the digital receiver 111, one bitstream including program data having clear content is provided to demultiplexer unit 250 and then to decoding unit 112 (Figure 1) for display and

10 viewing by a user, while a second bitstream including program data having scrambled content is available for recording by any component connected to transmission medium 120. As with the previous embodiments, a content or service provider can control when and if a user can copy or view again content which is copy-protected.

15 Some digital devices 110 may include an NRSS copy protection system having a detachable NRSS module. In instances where a detachable NRSS module is used, it is desirable to take advantage of the scrambled bitstream coming from the NRSS module. As seen in Figure 6, yet another embodiment of a digital receiver 111 is shown which includes an NRSS copy protection system

20 having a detachable NRSS module 640 and a DES ECB copy protection chip 642. In this embodiment, the bitstream is provided from demodulator 230 to the NRSS module which is detachably connected to the digital device 110.

Scrambled output from NRSS module 640 is "tapped" outside of the digital

device 110 prior to the bitstream's re-entry into the digital device 110 and is

provided to the digital interface 260 where it is preferably marked as "copy free"

and then transmitted over the transmission medium 120. A second scrambled

5   stream is provided to the DES ECB copy protection chip 642 for descrambling.

One descrambled stream is then provided to the de-multiplexer unit 250, while a

second descrambled stream is provided to the digital interface 260 where it is

preferably marked as "copy never" and then transmitted over the transmission

medium 120. Again, in such embodiment, a content or service provider can

10   control when and if a user can copy or view again content which is copy-

protected.

The content of a digital program may be transmitted in scrambled form. In

order for a conditional access unit to recover the scrambled content and permit a

person to view the content in clear form, the unit must have the necessary

15   access requirements associated with the scrambled content. An access

requirement includes a message that describes the features that the conditional

access unit must have in order to decode the scrambled content. For example,

a certain key may be needed to view the content. Alternatively, a service tag

associated with a given content provider may be required. Technical

20   requirements such as a particular descrambling method may also be required

and included as a part of the access requirements. The access requirements

associated with a particular program may be transmitted to a conditional access unit along with the program.

When a scrambled program is received by a conditional access unit, the access requirements for the program are compared to the entitlements that the conditional access unit actually has. In order for the conditional access unit to display the scrambled content in clear form, the access requirements for the program must match the entitlements of the conditional access unit. The entitlements may state that the conditional access unit is entitled to view content from a given service provider such as HBO, for example. The entitlements may also include one or more keys needed to descramble the content. The entitlements also may define the time periods for which the conditional access unit may descramble programs. The access requirements and entitlements thus form a part of the access control system to determine whether a decoder is authorized to view a particular program.

The access requirements and entitlements can provide consumers with a variety of choices for paying for the content and gaining access to the scrambled content. These choices may include pay per play (PPP), pay per view (PPV), impulse pay per view (IPPV), time based historical, pay per time (PPT), repurchase of copy never movies, personal scrambling, and regional pay per view. Impulse pay per view is a feature which allows purchase of pay per view movies through credit that has been previously downloaded into the set top box. Purchase records may be stored and forwarded by phone to a billing center.

Time based historical allows access to content that was delivered during a past time period, such as March through December, 1997, for example. The access requirements and entitlements can also provide consumers with different options for storing the scrambled content.

5   These options may be selected by choosing one of a number CA descriptors that have been included in the Service Information (SI) provided by the Service Provider. A terrestrial broadcaster may use CA descriptors defined by an organization such as the ATSC. A cable system operator may use descriptors defined by the Society of Cable Telecommunication Engineers

10   (SCTE). By choosing a CA descriptor, for example the MPAA approved DVD movie standard, a consumer can store the content to a writeable DVD. Included in that content may be the encrypted manufacturer keys needed to descramble that content. The manufacturer keys may be delivered in a PID called out by the CA Program Map Table (PMT). The keys may be stored on the DVD. On

15   playback in a DVD player, the proper manufacturer key for the particular manufacturer of the DVD player can be selected, and the content descrambled accordingly. For example, choosing the DIVX descriptor, allows the storing of content in DIVX format. Similar to DVD, the CAT PID in the CA PMT may select the keys used with the content. A DIVX player may access the content as it

20   normally would access packaged content.

These storage options are available even as realtime descrambling options are available. A consumer may decide which of the operations he or she

wishes to perform. Note that with realtime descrambling options, a CAT may call out a PID where an EMM may be obtained. However, in the DVD and DIVX examples, for instance, EMMs may not be delivered with the content that way. They may be embedded in the player and/or delivered by phone.

5   The program as delivered over the air is conditional access scrambled. The scrambled content may be delivered along with a plurality of access requirements, including pay per view, for example. The conditional access unit can descramble the content for real-time viewing. However, the content may have copy generation management system information which marks the content

10   as copy never. This means that a clear version of the content may not be recorded. A scrambled version of the content can be treated as copy free. In other words, the scrambled content can be recorded in a digital storage medium for later retrieval.

The access requirements may be delivered to the conditional access unit

15   using packet identifiers (PIDs). Each PID may contain the access requirements associated with a given service or feature. For example, figure 7 shows that PID 10 contains access requirements for a pay per time feature. Thus, the content that is delivered to a conditional access unit may also include a large number of PIDs, thus enabling special revenue features, technical features, or other special

20   features to be performed locally.

Before receiving the content, the customer may be given a number of choices for gaining access to the content that is going to be stored to media. The customer

may be required to purchase the right to access and view the content. Therefore, if the customer wants to record the content for later retrieval and viewing, the access requirements that the customer bought also need to be stored with the content.

5   When a digital program is recorded, the access requirements needed to view the program may also be recorded along with the program. The access criteria can be delivered to the conditional access device in packet identifiers (PIDs). Figure 7 shows an example of several PIDs that may be delivered to a conditional access device. PIDs 8 and 9 are for the scrambled audio and video

10   content. PIDs 10, 11, 12 and 13 point to the entitlement control messages for several methods of obtaining the access requirements for the scrambled program content. For example, the user may wish to pay for the content on a pay-per-time basis.

     PID 10, which contains the access requirements for pay-per-time, is

15   allowed to pass through the PID filtering function and is recorded in the storage device. The other access requirements, which represent alternative methods of paying for the content, do not pass through the PID filtering function and are thus squelched. The filtering function may be performed by the decoder 250 of the conditional access device.

20   Recording only the access requirements that the customer has bought provides several advantages. Recording the scrambled content locally enables the special revenue features such as PPV, PPT, and delayed IPPV, for example.

A large number of PIDs may be delivered to the conditional access unit to enable these special features. By recording only the PID or PIDs for the service that the customer desires, the storage requirements are reduced. Also, when the customer plays back the content, it would be confusing to the customer to

5   display the payment options again, after the customer has already selected one option. After a customer has decided to view a program as pay per time, for example, the customer should not be able to access the content any other way. This prevents confusion to the customer. The conditional access system is able to process the stream prior to being recorded. The conditional access system

10   can mark the content on the media in order to facilitate future retrieval and access, which allows for a customization of the access rights.

The security of the system is also improved by the filtering function shown in figure 7. Recording only one set of access requirements securely prevents hackers from tampering with the conditional access features, because the

15   complexity of the system is reduced. Recording one set of requirements can be done securely. Simplified access using only one option, such as PPV, for example, simplifies the processing, the cryptography, and reduces protocol problems, because only one set of access requirements has to be tracked.

Figure 8 shows an alternative embodiment that includes regional pay per

20   view. Customers in different regions may have different access requirements for a program, such as different costs. If a person in region 1 wishes to record the

scrambled content and view it at a later time, only the access requirements for region 1 pass through the filter and are recorded in the digital storage medium.

Thus, an advantage of recording only the access requirements for one region is that it is much simpler than putting all access rights for all regions in one ECM. Thus, the system is enabled to offer different costs to different regions. Another advantage is the reduced storage requirements, which is much less than recording all of the regions, and recording information that does not concern a given customer. This way a customer can listen to what is needed and simplify the filtering, because the PID filtering function is based on one region.

Figure 9 shows an alternative embodiment that includes personal scrambling features to be delivered to the conditional access device in PIDs. The personal scrambling features allow a customer to customize the special features.

The PIDs can be used to enable a home entertainment system to provide simulcrypting for two or more conditional access units. One conditional access unit 240 may be permanently embedded in the program viewing unit 111. For example, a digital television may contain a conditional access unit inside of the television. The conditional access unit inside of such a system may not be upgraded without replacing the host device. Also, the conditional access unit 240 may be enabled to function with content delivered by a service provider. The user can receive content from a service provider by paying a monthly

subscription fee, for example. The service provider may not be concerned with providing copy control of the content that is delivered to the user. The service provider may only care about receiving a subscription fee and delivering content to the user. Therefore, a relatively simple conditional access device can provide

5   real time access to content delivered to the program viewing unit from the service provider.

However, the provider or owner of the content that is delivered by the service provider may provide copy control protection to the delivered content, so that the content may be descrambled and viewed in real time but may not be

10   copied in a descrambled format. The content provider, or the viewer, or both, may want a conditional access unit that is able to record the program content and descramble it at a later time. Features such as pay per play and pay per time, which are discussed above, can permit a user to record the content and view it at a later date while protecting the interests of the owner of the content. If

15   the conditional access unit in the program viewing unit does not have the ability to handle features such as pay per view, then a second conditional access unit may be added.

The second conditional access unit 180 can be attached to the home entertainment system, as shown in figure 1. The second conditional access unit

20   180 can be a device capable of enabling features such as pay per view to be provided to a user of the home entertainment system. The second conditional access unit may use an interface, such as 1394 interface, for example, so that it

does not have to be attached to a pre-designated slot in the program data receiver, as shown in figure 10.

The program data receiver may function as a controller for 1394 devices in the home entertainment network. The receiver can direct the content to be
5 stored on 1394 storage devices such as a 1394 VCR or hard disk, for example, when a user wishes to view the content, the content can be retrieved from memory and delivered to the second conditional access unit on the 1394 bus, as shown in figure 11. The second conditional access unit then descrambles the content so that it can be displayed in clear format. In one embodiment, the
10 second conditional access unit can receive a key to descramble the content using a telephone line.

In one embodiment, the content is delivered to the program data receiver in a scrambled format. A packet identifier (PID) that contains the access requirements, including a key, needed to descramble the content and view it
15 using the first conditional access unit is delivered to the program data receiver. A second packet identifier that contains the access requirements for descrambling the scrambled data by the second conditional access device is also delivered. The second PID may be delivered along with the first PID. Alternatively, the second PID may be delivered at a later time. Additional packet
20 identifiers, for enabling various features of the home entertainment system, may also be provided as discussed above.

The first conditional access unit and its associated PID can descramble the content and provide the clear content to a display. The scrambled data may be stored in memory. The second PID may also be stored in memory. The second conditional access unit can descramble the content using the second PID. Because the second conditional access unit can use one or more PIDs that enable the scrambled content to be stored to a digital memory, retrieved from memory, and descrambled at a later time, the user can create a home library of stored content. Furthermore, the home entertainment system can be upgraded and additional features can be enabled by the second conditional access unit without replacing the program viewing unit.

In one embodiment, figure 12 shows a method for descrambling the scrambled data that includes receiving the scrambled data in a program data receiver, step 1210. A first access key to descramble the scrambled data, and a second access key to descramble the scrambled data are also received 1220. Each access key may be contained in one or more PIDs. The first access key is associated with a first conditional access unit, and the second access key is associated with a second conditional access unit.

The scrambled data can be descrambled in real time, for example, using the first conditional access unit and the first key 1230. Then, the scrambled data and the second access key are recorded in a computer readable memory 1240. The second access key and the scrambled data can be retrieved from the

memory 1250, and the scrambled data can be descrambled using the second conditional access unit and the second access key 1260.

The second access key permits the second conditional access unit to descramble the scrambled data during a time period including a present time period and a future time period. Alternatively, the first conditional access unit can descramble the scrambled data during a first period, and the second conditional access unit can descramble the scrambled data during a second period that is different from the first period.

In an alternative embodiment, figure 13 shows a method for copy management for controlling the recording and reproduction of digital content that includes receiving a digital bitstream including program data 1310. The program data may include system information and the digital content in a scrambled format. The digital content in a scrambled format is descrambled to provide a first output including said digital content in a descrambled format 1320. A second output including said digital content in the scrambled format is provided 1330. The first output including said digital content in the descrambled format and the second output including said digital content in the scrambled format are output 1340. A plurality of access requirements are received 1350, wherein each access requirement can descramble the program data. At least one of the access requirements is selected 1360. The scrambled program data and the selected at least one access requirement are stored 1370.

The method may include receiving and recording said digital content of said second output in a scrambled format. The method may include demultiplexing the digital content from the program data, and decompressing the digital content in a descrambled format to a decompressed state 1380. The decompressing may be executed in an MPEG decoder. The digital content may be content contained in digital television transmissions. Alternatively, the digital content may be content downloaded from the Internet.

The descrambling may be carried out in a first conditional access unit. The stored scrambled program data and the stored access requirement can be retrieved. Then, the retrieved scrambled program can be descrambled using the access requirement in a second conditional access unit. The descrambling step may include extracting a descrambling key included in the program data, and applying said descrambling key to said digital content in a scrambled format to provide said digital content in a descrambled format.

The method of receiving scrambled data, receiving a first access key to descramble the scrambled data using a first conditional access unit, and receiving a second access key to descramble the scrambled data using a second conditional access unit is a method of simulcrypting. Two different conditional access units are enabled to descramble the scrambled data. In one embodiment, two different PIDs, received along with the scrambled content, enable the two conditional access units to descramble the data. One conditional access unit may descramble the data before it is recorded, to provide real-time

viewing. The other conditional access unit may descramble the data after it is recorded and subsequently retrieved from memory, to provide time-shifted simulcrypting, or viewing at a later time.

In one embodiment, figure 14 shows that two different programs can be
5 delivered to the program viewing unit simultaneously 1410. A first program may be sent to the viewing unit along with a PID to be used by the first conditional access unit to descramble the first program in real time, step 1420. A second program may be sent using the opportunistic bandwidth that is available, step 1430. Because the bandwidth needed to send the first program fluctuates, the
10 second program can be sent in non-real time by taking advantage of this fluctuating bandwidth. Thus, the second program, along with a PID for enabling the second conditional access device to descramble the second program, can be trickled into digital memory and viewed at a later time, step 1440.

In the foregoing description, the invention is described with reference to
15 specific exemplary embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the present invention as set forth in the appended claims. The specification and drawings are accordingly to be regarded in an illustrative rather than in a restrictive sense.

What is claimed is:

1 1. A method comprising:

2 receiving scrambled data;

3 receiving a first access key to descramble the scrambled data;

4 receiving a second access key to descramble the scrambled data.

1 2. The method of claim 1 wherein the first access key is associated with a

2 first conditional access unit.

1 3. The method of claim 2 wherein the second access key is associated with

2 a second conditional access unit.

1 4. The method of claim 3 further comprising descrambling the scrambled

2 data using the first conditional access unit and the first key.

1 5. The method of claim 4 further comprising recording the scrambled data

2 and the second access key in a computer readable memory.

1 6. The method of claim 5 further comprising retrieving the second access

2 key and the scrambled data from the memory.

1   7.   The method of claim 6 further comprising descrambling the scrambled

2   data using the second conditional access unit and the second access key.

1   8.   The method of claim 7 wherein the second access key permits the second

2   conditional access unit to descramble the scrambled data during a time period

3   including a present time period and a future time period.

1   9.   The method of claim 7 wherein the first conditional access unit

2   descrambles the scrambled data during a first period, and the second conditional

3   access unit descrambles the scrambled data during a second period that is

4   different from the first period.

1   10.   A copy management method for controlling the recording and

2   reproduction of digital content comprising:

3   receiving a digital bitstream including program data, said program data

4   including system information and said digital content in a scrambled format;

5   descrambling said digital content in a scrambled format to provide a first

6   output including said digital content in a descrambled format;

7   providing a second output including said digital content in the scrambled

8   format;

9   outputting said first output including said digital content in the

10   descrambled format and the second output including said digital content in the

11   scrambled format;

12   receiving a plurality of access requirements, wherein each access

13   requirement can descramble the program data;

14   selecting at least one of the access requirements;

15   storing the scrambled program data and the selected at least one access

16   requirement.

1   11.   The copy management method of claim 10, further comprising receiving

2   and recording said digital content of said second output in a scrambled format.

1   12.   The copy management method of claim 10, further comprising:

2   demultiplexing said digital content from said program data; and

3   decompressing said digital content in a descrambled format to a

4   decompressed state.

1   13.   The copy management method of claim 10, wherein said decompressing

2   is executed in an MPEG decoder.

1   14.   The copy management method of claim 10, wherein said digital content is

2   content contained in digital television transmissions.

1   15.   The copy management method of claim 10, wherein said digital content is

2   content downloaded from the Internet.

1   16.   The copy management method of claim 10, wherein said descrambling is

2   carried out in a first conditional access unit.

1   17.   The copy management method of claim 16, further comprising:

2   retrieving the stored scrambled program data and the stored access

3   requirement;

4   descrambling the scrambled program using the access requirement in a

5   second conditional access unit.

1   18.   The copy management method of claim 10, wherein said descrambling

2   comprises:

3   extracting a descrambling key included in said program data; and

4   applying said descrambling key to said digital content in a scrambled

5   format to provide said digital content in a descrambled format.

1   19.   An apparatus comprising:

2   a receiver to receive scrambled data;

3   a first descrambler to use a first access key to descramble the scrambled

4   data;

5   a second descrambler to use a second access key to descramble the

6   scrambled data.

1   20.   The apparatus of claim 19 wherein the first access key is associated with

2   a first conditional access unit.

1   21.   The apparatus of claim 20 wherein the second access key is associated

2   with a second conditional access unit.

1   22.   The apparatus of claim 21 wherein the first descrambler can descramble

2   the scrambled data using the first conditional access unit and the first key.

1   23.   The apparatus of claim 22 further comprising a recorder to record the

2   scrambled data and the second access key in a computer readable memory.

1   24.   The apparatus of claim 23 further comprising a retriever to retrieve the

2   second access key and the scrambled data from the memory.

1   25.   The apparatus of claim 24 wherein the second descrambler can

2   descramble the scrambled data using the second conditional access unit and the

3   second access key.

1   26.   The apparatus of claim 25 wherein the second access key permits the

2   second conditional access unit to descramble the scrambled data during a time

3   period including a present time period and a future time period.

1   27.   The apparatus of claim 25 wherein the first conditional access unit

2   descrambles the scrambled data during a first period, and the second conditional

3   access unit descrambles the scrambled data during a second period that is

4   different from the first period.

1   28.   A copy management apparatus for controlling the recording and

2   reproduction of digital content comprising:

3   a receiver to receive a digital bitstream including program data, said

4   program data including system information and said digital content in a

5   scrambled format;

6   a descrambler to descramble said digital content in a scrambled format to

7   provide a first output including said digital content in a descrambled format, to

8   provide a second output including said digital content in the scrambled

9   format;

10   outputting said first output including said digital content in the

11 descrambled format and the second output including said digital content in the

12 scrambled format;

13   receiving a plurality of access requirements, wherein each access

14   requirement can descramble the program data;

15   selecting at least one of the access requirements;

16   storing the scrambled program data and the selected at least one access

17   requirement.

1   29.   The copy management apparatus of claim 28, further comprising

2   receiving and recording said digital content of said second output in a scrambled

3   format.

1   30.   The copy management method of claim 28, further comprising:

2   demultiplexing said digital content from said program data; and

3   decompressing said digital content in a descrambled format to a

4   decompressed state.

1   31.   The copy management method of claim 28, wherein said decompressing

2   is executed in an MPEG decoder.

1   32.   The copy management method of claim 28, wherein said digital content is

2   content contained in digital television transmissions.

1   33.   The copy management apparatus of claim 28, wherein said digital content

2   is content downloaded from the Internet.

1   34.   The copy management apparatus of claim 28, wherein said descrambling

2   is carried out in a first conditional access unit.

1   35.   The copy management apparatus of claim 34, further comprising:

2   retrieving the stored scrambled program data and the stored access

3   requirement;

4   descrambling the scrambled program using the access requirement in a

5   second conditional access unit.

1   36.   The copy management apparatus of claim 28, wherein said descrambling

2   step comprises:

3   extracting a descrambling key included in said program data; and

4   applying said descrambling key to said digital content in a scrambled

5   format to provide said digital content in a descrambled format.

1   37.   A computer readable medium containing instructions which, when

2   executed by a processing system, cause the system to perform:

3   receiving scrambled data;

4   receiving a first access key to descramble the scrambled data;

5   receiving a second access key to descramble the scrambled data.

1   38.   The medium of claim 37 wherein the first access key is associated with a

2   first conditional access unit.

1   39.   The medium of claim 38 wherein the second access key is associated

2   with a second conditional access unit.

1   40.   The medium of claim 39 further comprising descrambling the scrambled

2   data using the first conditional access unit and the first key.

1   41.   The medium of claim 40 further comprising recording the scrambled data

2   and the second access key in a computer readable memory.

1   42.   The medium of claim 41 further comprising retrieving the second access

2   key and the scrambled data from the memory.

1   43.   The medium of claim 42 further comprising descrambling the scrambled

2   data using the second conditional access unit and the second access key.

1   44.   The medium of claim 43 wherein the second access key permits the

2   second conditional access unit to descramble the scrambled data during a time

3   period including a present time period and a future time period.

1   45.   The medium of claim 43 wherein the first conditional access unit

2   descrambles the scrambled data during a first period, and the second conditional

3   access unit descrambles the scrambled data during a second period that is

4   different from the first period.

1   46.   A computer readable medium containing instructions which, when

2   executed by a processing system, cause the system to perform a method for

3   controlling the recording and reproduction of digital content comprising:

4   receiving a digital bitstream including program data, said program data

5   including system information and said digital content in a scrambled format;

6   descrambling said digital content in a scrambled format to provide a first

7   output including said digital content in a descrambled format;

8   providing a second output including said digital content in the scrambled

9   format;

10   outputting said first output including said digital content in the

11   descrambled format and the second output including said digital content in the

12   scrambled format;

13   receiving a plurality of access requirements, wherein each access

14   requirement can descramble the program data;

15   selecting at least one of the access requirements;

16   storing the scrambled program data and the selected at least one access

17   requirement.

1   47.   The medium of claim 46, wherein the instructions, when executed by the

2   processing system, further cause the system to perform receiving and recording

3   said digital content of said second output in a scrambled format.

1   48.   The medium of claim 46, wherein the instructions, when executed by the

2   processing system, further cause the system to perform:

3   demultiplexing said digital content from said program data; and

4   decompressing said digital content in a descrambled format to a

5   decompressed state.

1   49.   The medium of claim 47, wherein said decompressing is executed in an

2   MPEG decoder.

1   50.   The medium of claim 46, wherein said digital content is content contained

2   in digital television transmissions.

1   51.   The medium of claim 46, wherein said digital content is content

2   downloaded from the Internet.

1   52.   The medium of claim 46, wherein said descrambling is carried out in a first

2   conditional access unit.

1   53.   The medium of claim 52, wherein the instructions, when executed by the

2   processing system, further cause the system to perform:

3   retrieving the stored scrambled program data and the stored access

4   requirement;

5   descrambling the scrambled program using the access requirement in a

6   second conditional access unit.

1   54.   The medium of claim 46, wherein said descrambling step comprises:

2   extracting a descrambling key included in said program data; and

3   applying said descrambling key to said digital content in a scrambled

4   format to provide said digital content in a descrambled format.

1   55.   An apparatus comprising:

2   means for receiving scrambled data;

3   means for receiving a first access key to descramble the scrambled data;

4   means for receiving a second access key to descramble the scrambled

5   data.

1   56.   The apparatus of claim 55 wherein the first access key is associated with

2   a first conditional access unit.

1   57.   The apparatus of claim 56 wherein the second access key is associated

2   with a second conditional access unit.

1   58.   The apparatus of claim 57 further comprising means for descrambling the

2   scrambled data using the first conditional access unit and the first key.

1   59.   The apparatus of claim 58 further comprising means for recording the

2   scrambled data and the second access key in a computer readable memory.

1   60.   The apparatus of claim 59 further comprising means for retrieving the

2   second access key and the scrambled data from the memory.

1   61.   The apparatus of claim 60 further comprising means for descrambling the

2   scrambled data using the second conditional access unit and the second access

3   key.

1   62.   The apparatus of claim 61 wherein the second access key permits the

2   second conditional access unit to descramble the scrambled data during a time

3   period including a present time period and a future time period.

1   63.   The apparatus of claim 61 wherein the first conditional access unit

2 descrambles the scrambled data during a first period, and the second conditional

3 access unit descrambles the scrambled data during a second period that is

4 different from the first period.

1   64.   A copy management apparatus for controlling the recording and

2 reproduction of digital content comprising:

3   means for receiving a digital bitstream including program data, said

4 program data including system information and said digital content in a

5 scrambled format;

6   means for descrambling said digital content in a scrambled format to

7 provide a first output including said digital content in a descrambled format;

8   means for providing a second output including said digital content in the

9 scrambled format;

10   means for outputting said first output including said digital content in the

11 descrambled format and the second output including said digital content in the

12 scrambled format;

13   means for receiving a plurality of access requirements, wherein each

14 access requirement can descramble the program data;

15   means for selecting at least one of the access requirements;

16   means for storing the scrambled program data and the selected at least

17   one access requirement.

1   65.   The copy management apparatus of claim 64, further comprising means

2   for receiving and recording said digital content of said second output in a

3   scrambled format.

1   66.   The copy management apparatus of claim 64, further comprising:

2   means for demultiplexing said digital content from said program data; and

3   means for decompressing said digital content in a descrambled format to

4   a decompressed state.

1   67.   The copy management apparatus of claim 64, wherein said

2   decompressing is executed in an MPEG decoder.

1   68.   The copy management apparatus of claim 64, wherein said digital content

2   is content contained in digital television transmissions.

1   69.   The copy management apparatus of claim 64, wherein said digital content

2   is content downloaded from the Internet.

1   70.   The copy management apparatus of claim 64, wherein said descrambling

2   is carried out in a first conditional access unit.

1   71.   The copy management apparatus of claim 70, further comprising:

2   means for retrieving the stored scrambled program data and the stored

3   access requirement;

4   means for descrambling the scrambled program using the access

5   requirement in a second conditional access unit.

1   72.   The copy management apparatus of claim 64, wherein said means for

2   descrambling comprises:

3   means for extracting a descrambling key included in said program data;

4   and

5   means for applying said descrambling key to said digital content in a

6   scrambled format to provide said digital content in a descrambled format.

ABSTRACT

In accordance with one embodiment, a method for storing a normal scrambled digital program is provided. The method includes receiving a scrambled program, and receiving a plurality of access requirements. Each

5   access requirement can descramble the scrambled program. The method also includes selecting at least one of the access requirements, and storing the scrambled program and the selected requirement.

FIG. 1

110

111   112

100

120

130   AUDIO SYSTEM

140   DIGITAL VCR

150   HARD DISK RECORDING UNIT

160   DISPLAY

170   CONTROL UNIT

180   CONDITIONAL ACCESS UNIT

FIG. 2

FIG. 3

240

PROCESSOR UNIT 330

335

436

DE-SCRAMBLER UNIT 340

345

332
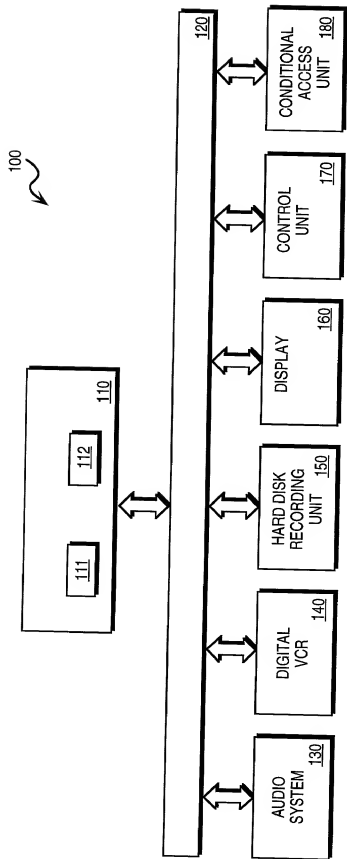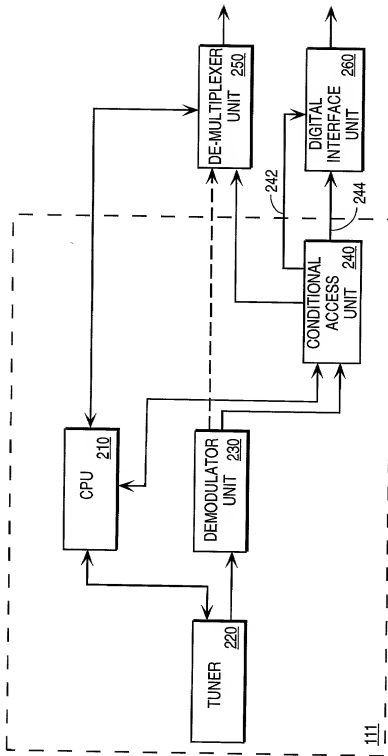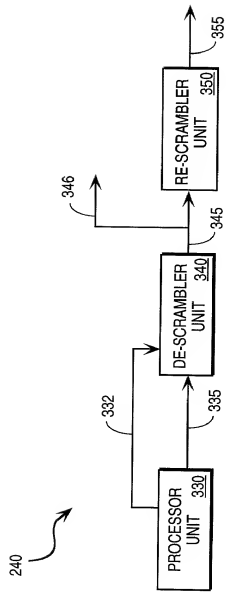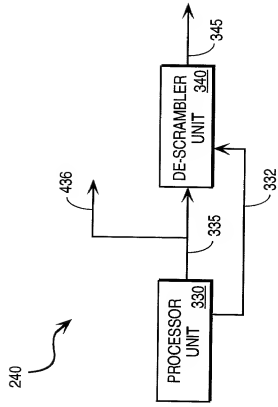
FIG. 4
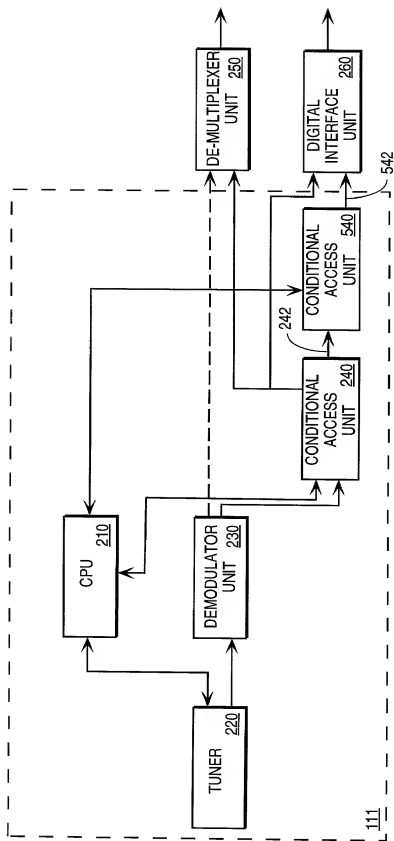
FIG. 5
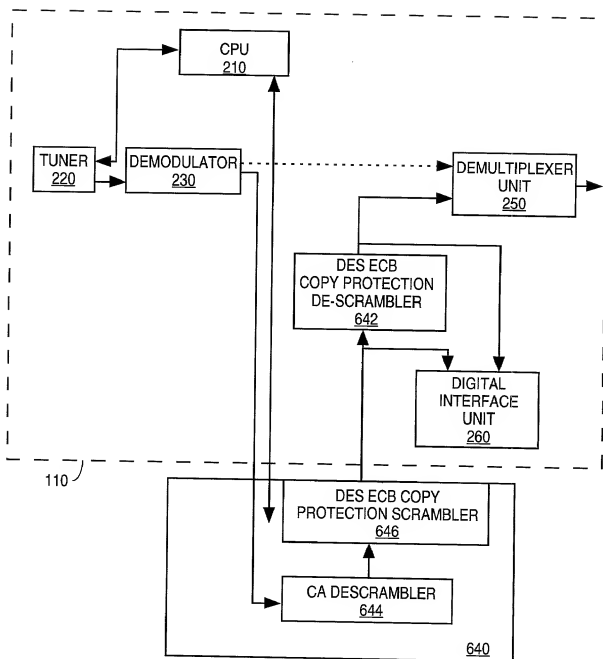
FIG. 6

DIFFERENT ACCESS REQUIREMENTS ON DIFFERENT PIDS, FILTERING OUT ALL BUT ONE:

FIG. 7

DIFFERENT ACCESS REQUIREMENTS ON DIFFERENT PIDS, FILTERING OUT ALL BUT ONE.

REGION 1:
IPPV COST
BLACK-OUT
ACCESS REQS
ECMS

REGION 2:
IPPV COST
BLACK-OUT
ACCESS REQS
ECMS

REGION 3:
IPPV COST
BLACK-OUT
ACCESS REQS
ECMS

REGION 4:
IPPV COST
BLACK-OUT
ACCESS REQS
ECMS

ACCESS METHODS

PID 10

PID 11

PID 12

PID 13

PID FILTERING FUNCTION

PIDS 11, 12 13 ARE SQUELCHED

PID 10

REGION 1

ONLY REGION 1 ECMS ARE RECORDED FROM PID 10

PID 9   SCRAMBLED VIDEO

PID 8   SCRAMBLED AUDIO

D_VCR STORAGE DEVICE

FIG. 8

ACCESS METHODS ⟶

PAY-PER-TIME
PERSONAL COPY
COST X, Y, Z
ACCESS REQS
ECMS

PAY-PER-TIME
FAMILY COPY
COST A, B, C
ACCESS REQS
ECMS

PAY-PER-TIME
SHAREABLE COPY
COST H, I, J
ACCESS REQS
ECMS

PAY-PER-TIME
PERSONAL COPY
COST M, N, O
ACCESS REQS
ECMS

PID 10

PID 11

PID 12

PID 13

PID FILTERING FUNCTION

PIDS 11, 12 13 ARE SQUELCHED

PID 10

PERSONAL

ONLY PERSONAL COPY ECMS ARE RECORDED FROM PID 10

PID 9 VIDEO

PID 8 AUDIO

D_VCR
STORAGE DEVICE

FIG. 9

PROPOSED SYSTEM

STORAGE:

FIG. 10

PLAYBACK:

D_VCR
STORAGE
DEVICE

SCRAMBLED CONTENT

HOME
NETWORK CA
MODULE

(CA #2)

TELEPHONE

CLEAR CONTENT

DTV
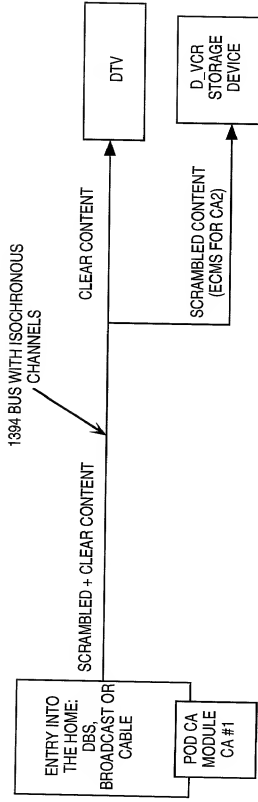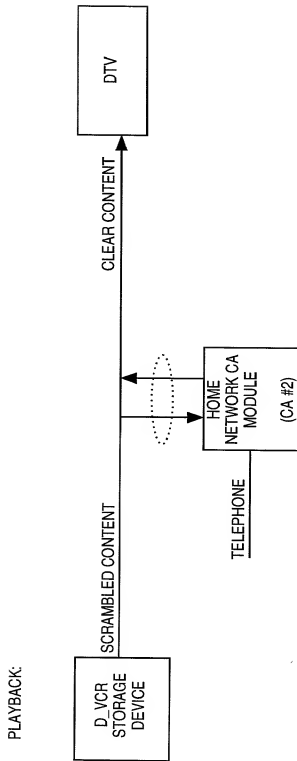
FIG. 11

RECEIVED SCRAMBLED DATA — 1210

RECEIVE ACCESS KEYS TO DE-SCRAMBLE THE SCRAMBLED DATA — 1220

USE A FIRST CONDITIONAL ACCESS UNIT AND A FIRST ACCESS KEY TO DE-SCRAMBLE THE SCRAMBLED DATA — 1230

STORE THE SCRAMBLED DATA AND A SECOND ACCESS KEY IN A DIGITAL MEMORY — 1240

RETRIEVE THE SCRAMBLED DATA AND THE ACCESS KEY — 1250

USE A SECOND CONDITIONAL ACCESS UNIT AND THE SECOND ACCESS KEY TO DE-SCRAMBLE THE SCRAMBLED DATA — 1260

FIG. 12

RECEIVE A DIGITAL BITSTREAM INCLUDING SCRAMBLED PROGRAM DATA — 1310

DE-SCRAMBLE THE PROGRAM DATA USING A FIRST CONDITIONAL ACCESS UNIT AND PROVIDE THE DE-SCRAMBLED DATA TO A FIRST OUTPUT — 1320

PROVIDE THE SCRAMBLED DATA TO A SECOND OUTPUT — 1330

OUTPUT THE DE-SCRAMBLED DATA AND THE SCRAMBLED DATA — 1340

RECEIVE A PLURALITY OF ACCESS REQUIREMENTS — 1350

SELECT AT LEAST ONE ACCESS REQUIREMENT — 1360

STORE THE SCRAMBLED PROGRAM DATA AND THE SELECTED ACCESS REQUIREMENT — 1370

RETRIEVE AND DE-SCRAMBLE THE SCRAMBLED PROGRAM DATA INCLUDING DEMULTIPLEXING THE DIGITAL CONTENT FROM THE PROGRAM DATA AND DECOMPRESSING THE DIGITAL CONTENT IN A DE-SCRAMBLED FORMAT TO A DECOMPRESSED STATE, USING A SECOND CONDITIONAL ACCESS UNIT AND THE SELECTED ACCESS REQUIREMENT — 1380

FIG. 13

```
┌─────────────────────────────────┐
│   DELIVER A FIRST PROGRAM AND A  │      1410
│    SECOND PROGRAM VIEWING UNIT   │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  DE-SCRAMBLE THE FIRST PROGRAM IN│      1420
│  REAL TIME USING A FIRST CONDITIONAL │
│            ACCESS  UNIT          │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│ RECEIVE THE SECOND PROGRAM DURING│      1430
│    OPPORTUNISTIC,  FLUCTUATING   │
│  BANDWIDTH OF THE FIRST PROGRAM  │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   STORE THE SECOND PROGRAM IN    │      1440
│ MEMORY, AND VIEW IT AT A LATER TIME │
│ USING A SECOND CONDITIONAL ACCESS│
│              UNIT                │
└─────────────────────────────────┘
```

FIG. 14

Attorney's Docket No.: <u>80398.P217</u>   <u>Patent</u>
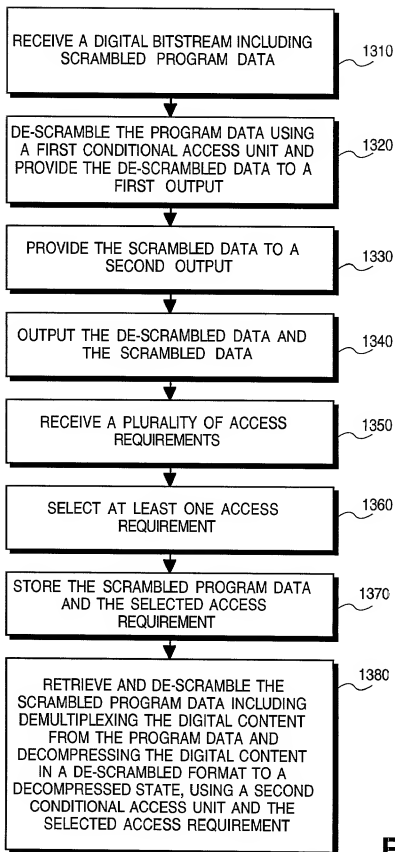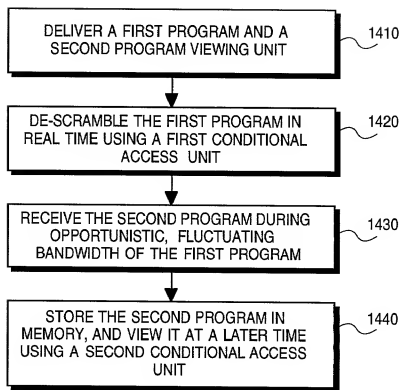
<u>DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION</u>

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD FOR SIMULCRYPTING SCRAMBLED DATA TO A PLURALITY OF CONDITIONAL ACCESS DEVICES

the specification of which

>   <u> X </u>   is attached hereto.
>   <u>   </u>   was filed on _____ as
>   United States Application Number _____
>   or PCT International Application Number _____
>   and was amended on _____.
>   (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s)</u>

			Priority Claimed	
_____	_____	_____	____	____
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	____	____
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	____	____
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

_____   _____
  (Application Number)   Filing Date

_____   _____
  (Application Number)   Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

_____   _____   _____
  (Application Number)   Filing Date   (Status -- patented,
                                                         pending, abandoned)

_____   _____   _____
  (Application Number)   Filing Date   (Status -- patented,
                                                         pending, abandoned)

I hereby appoint the persons listed on Appendix A hereto (which is incorporated by reference and a part of this document) as my respective patent attorneys and patent agents, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to __Jeffrey S. Smith__, BLAKELY, SOKOLOFF, TAYLOR &
                         (Name of Attorney or Agent)
ZAFMAN LLP, 12400 Wilshire Boulevard 7th Floor, Los Angeles, California 90025 and direct
telephone calls to _____Jeffrey S. Smith_____, (408) 720-8598.
                    (Name of Attorney or Agent)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor Brant L. Candelore

Inventor's Signature ___*Brant L. Candelore*___   Date __10/21/99__

Residence _Escondido, California_ Citizenship ___USA___
              (City, State)   (Country)

Post Office Address _10124 Quail Glen Way_
                    Escondido, California 92029-6502

APPENDIX A

William E. Alford, Reg. No. 37,764; Farzad E. Amini, Reg. No. P42,261; Aloysius T. C. AuYeung, Reg. No. 35,432; William Thomas Babbitt, Reg. No. 39,591; Carol F. Barry, Reg. No. 41,600; Jordan Michael Becker, Reg. No. 39,602; Bradley J. Bereznak, Reg. No. 33,474; Michael A. Bernadicou, Reg. No. 35,934; Roger W. Blakely, Jr., Reg. No. 25,831; Gregory D. Caldwell, Reg. No. 39,926; Ronald C. Card, Reg. No. P44,587; Yong S. Choi, Reg. No. P43,324; Thomas M. Coester, Reg. No. 39,637; Michael Anthony DeSanctis, Reg. No. 39,957; Daniel M. De Vos, Reg. No. 37,813; Robert Andrew Diehl, Reg. No. 40,992; Tarek N. Fahmi, Reg. No. 41,402; James Y. Go, Reg. No. 40,621; Dinu Gruia, Reg. No. P42,996; Willmore F. Holbrow III, Reg. No. P41,845; George W Hoover II, Reg. No. 32,992; Eric S. Hyman, Reg. No. 30,139; Dag H. Johansen, Reg. No. 36,172; William W. Kidd, Reg. No. 31,772; Michael J. Mallie, Reg. No. 36,591; Andre L. Marais, under 37 C.F.R. § 10.9(b); Paul A. Mendonsa, Reg. No. 42,879; Darren J. Milliken, Reg. 42,004; Lisa A. Norris, Reg. No. P44,976; Thien T. Nguyen, Reg. No. 43,835; Thinh V. Nguyen, Reg. No. 42,034; Dennis A. Nicholls, Reg. No. 42,036; Kimberley G. Nobles, Reg. No. 38,255; Daniel E. Ovanezian, Reg. No. 41,236; Babak Redjaian, Reg. No. 42,096; James H. Salter, Reg. No. 35,668; William W. Schaal, Reg. No. 39,018; James C. Scheller, Reg. No. 31,195; Anand Sethuraman, Reg. No. P43,351; Charles E. Shemwell, Reg. No. 40,171; Jeffrey Sam Smith, Reg. No. 39,377; Maria McCormack Sobrino, Reg. No. 31,639; Stanley W. Sokoloff, Reg. No. 25,128; Judith A. Szepesi, Reg. No. 39,393; Vincent P. Tassinari, Reg. No. 42,179; Edwin H. Taylor, Reg. No. 25,129; George G. C. Tseng, Reg. No. 41,355; Joseph A. Twarowski, Reg. No. 42,191; Lester J. Vincent, Reg. No. 31,460; Glenn E. Von Tersch, Reg. No. 41,364; John Patrick Ward, Reg. No. 40,216; Stephen Warhola, Reg. No. 43,237; Charles T. J. Weigell, Reg. No. 43,398; Kirk D. Williams, Reg. No. 42,229; James M. Wu, Reg. No. P45,241; Steven D. Yates, Reg. No. 42,242; Ben J. Yorks, Reg. No. 33,609; and Norman Zafman, Reg. No. 26,250; my patent attorneys, and James A. Henry, Reg. No. 41,064; my patent agent, of BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP, with offices located at 12400 Wilshire Boulevard, 7th Floor, Los Angeles, California 90025, telephone (310) 207-3800, and James R. Thein, Reg. No. 31,710, my patent attorney.

APPENDIX B

Title 37, Code of Federal Regulations, Section 1.56
Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclosure information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclosure all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1)   Prior art cited in search reports of a foreign patent office in a counterpart application, and

(2)   The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b)   Under this section, information is material to patentability when it is not cumulative to information already of record or being made or record in the application, and

(1)   It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2)   It refutes, or is inconsistent with, a position the applicant takes in:

(i)   Opposing an argument of unpatentability relied on by the Office, or

(ii)   Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c)   Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1)   Each inventor named in the application;

(2)   Each attorney or agent who prepares or prosecutes the application; and

(3)   Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.